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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,663	02/04/2004	James A. Zagzebski	1512.015	5594

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EXAMINER	
SAINT SURIN, JACQUES M	
ART UNIT	**PAPER NUMBER**
2856	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/772,663	ZAGZEBSKI ET AL.	
	Examiner	Art Unit	
	Jacques M. Saint-Surin	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *03 May 2005 and 04 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02/04/04* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 8/03/05.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jago et al. (US Patent 6,117,081) in view of Oelze (2002 Acoustical Society of America).

Regarding claims 1, 11, 22 and 31, Jago discloses a parametric ultrasonic system comprising: an ultrasonic transducer assembly (12) adaptable to provide ultrasonic signals at different angles from a plurality of voxels (scanlines A, B, C, D) in a region of interest (col. 3, lines 16-18); and a processor (30) receiving the echo signals and extracting a parametric measurement for each of the voxels based on

multiple frequency spectra from ultrasonic signals at different angles (col. 3, lines 26-58). Although Jago discloses spatial compoudings, it does not specifically disclose wherein the parametric measurement is selected from the group consisting of scatterer size or, scatterer spacing or scatterer number density. Oelze discloses parametrizing the microstructure of tissues has been accomplished by modeling the frequency-dependent scattering from tissues. Oelze further discloses the estimates of scatter sizes sfrom backscattered RF signals are attractive because they allow the resolving of subwavelength structure in a statistical sense. Relating the frequency dependent RF signal to models of the tissue microstructure leads to estimates of the scatter properties (see page 3054, second paragraph). it would have been obvious to one having ordinary skill in the art at the time of the invention was made to utilize in Jago the techniques of Oelz because the scatter properties is to minimize the averaged squared deviation (MASD) between the theoretical power spectrum and the measured power spectrum wherein the best estimate of the desired scatter property is the value of the scatter property that minimizes the square difference and the advantages in using estimates of the scatter properties like the average scatterer size is that the estimated property may be related to physical microstructures of the tissues thereby, making the above combination more effective and reliable.

Regarding claims 11, 22 and 31, they are similar in scope with claim 1 and therefore, they are rejected for the reasons set forth for that claim.

Regarding claims 2, 6 and 8, 23, 27 and 29, Jago discloses digital echo signals are processed by spatial compounding in a processor 30, but fails to disclose

processor produces a parametric measurement of scatterer size, spacing and density. Oelz discloses Figs 3-9 show the estimates of scatterer sizes from simulations and the phantom experiment as the depth increases incrementally by 1 mm in the scattering media. Figs. 3 and 4 show the average estimated scatter diameters from computer simulations of glass beds in agar (see pages 3058-3060). It would have been obvious to one having ordinary skill in the art to me motivated to recognize the advantages of utilizing the techniques of Oelz in the procesoor of Jago because it would provide parametric measurement of scatterer properties in a reliable manner.

Regarding claims 3-5, 7, 9-10, 12-14, 24, 28, 30 and 32-34, Jago discloses the scanline echo signals are filtered by a programmable digital filter 22, which defines the band of frequencies of interest. When imaging harmonic contrast agents or performing tissue harmonic imaging the passband of the filter 22 is set to pass harmonics of the transmit band. The filtered signals are then detected by a detector 24. In a preferred embodiment the filter and detector include multiple filters and detectors so that the received signals may be separated into multiple passbands, individually detected and recombined to reduce image speckle by frequency compounding. For B mode imaging the detector 24 will perform amplitude detection of the echo signal envelope. For Doppler imaging ensembles of echoes are assembled for each point in the image and are Doppler processed to estimate the Doppler shift or Doppler power intensity (col. 3, lines41-63).

Regarding claim 15 and 35, Jago discloses a spatial compound image comprising component frames of different angles of incidence to the same target will

contain acoustic shadows in different locations, reducing correlation between the component frames.

Regarding claims 16-20 and 36-39, Jago discloses a scan head 10 and array transducer 12 transmits beams at different angles and the transmission of the beams is controlled by a transmitter 14 which controls the phasing and time of actuation of each of the elements of the array transducer so as to transmit each beam from a predetermined origin along the array and at a predetermined angle (col. 3, lines 16-26) Jago further discloses the system controller controls the transmitter 14 to transmit the desired number of scanline groups at the desired angles, transmit energies and frequencies. The system controller also controls the digital beamformer to properly delay and combine the received echo signals for the apertures and image depths used.

Regarding claims 25-26, Jago discloses performing tissue harmonic imaging (col. 3, lines 43-44). Jago further discloses the digital signal processors are responsive to control parameters including image display depth, depth of region of greatest compounding, clinical application, compound display rate, mode of operation, and acquisition rate for determining the number of images to compound at a given instant in time. The digital signal processors select component frames stored in the frame memories 62 for assembly as a compound image in accumulator memory 64 (col. 46-60) Jago further discloses the image data of the component frames used to form a compound image is resampled to spatially register the component frames prior to compounding, thereby improving image quality by reducing blurring effects of overlapping unregistered image data. The resampling and registration of

component image frames is performed by the programming of the digital signal processors 60, which operate upon component images stored in the frame memories 62. (col. 4, lines 46-67).

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yu et al. (US Patent 6,524,252) discloses a method and system for generating ultrasound frames with decorrelated speckle patterns and generating a compound ultrasound image therefrom.

Entrekin et al. (US Patent 6,126,598) discloses ultrasonic diagnostic imaging system with adaptive spatial compounding.

Chambers et al. (US Patent 6,984,210 B2) discloses diagnostic analysis of ultrasound data.

Zagzebski et al. (US Pub. No. US 2004/0215075). Discloses ultrasonic elastography with angular compounding.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacques M. Saint-Surin whose telephone number is (571) 272-2206. The examiner can normally be reached on Mondays to Fridays between 10:30 A.M and 800 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jacques M. Saint-Surin
January 08, 2007

HEZRON WILLIAMS
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